

REMARKS

Reconsideration and the timely allowance of the pending claims, in view of the following remarks, are respectfully requested.

In the Final Office Action of October 10, 2006, the Examiner rejected claims 1-5, 8, and 10-26, under 35 U.S.C. §102(b), as allegedly being anticipated by Houston '173 (U.S. Patent No. 5,436,173); and rejected claims 1-5, 8-10, and 15-21, under 35 U.S.C. §103(a), as allegedly being unpatentable over Houston '173 in view of Geffken '498 (U.S. Patent No. 6,180,498).

By this Request, Applicants have not amended any claims and respectfully traverse the prior art rejections, under 35 U.S.C. §102(b), §103(a), for the following reasons:

I. Prior Art Rejections

As noted above, independent claim 1 positively recites, *inter alia*, patterning the first surface of the first substrate with ***normal alignment markers and at least one reversed alignment marker that is a mirror image of the normal alignment markers***. Claim 1 also positively recites locally etching said first substrate as far as said protective layer to ***form a trench around said at least one reversed alignment marker***. Claim 1 further positively recites forming at least one patterned layer on the second surface of the first substrate using a lithographic projection apparatus having an alignment system configured to ***align the second surface using the at least one reversed alignment marker(s) revealed by each of trench***.

These features are amply supported by the embodiments disclosed in the written description. (*See, e.g.*, Originally-filed Specification: par. [0048]- [0053]; FIGs. 2-8). For example, the disclosed embodiments describe that for some devices it is desirable to be able to create structures on both sides of a substrate using lithographic processes and, in many cases, the structures on opposite sides of the substrate need to be aligned with each other. Therefore, the lithographic apparatus has to align the pattern being projected onto the front side of a substrate to alignment markers on the backside. (*See*, Originally-filed Specification: par. [0014]).

To this end, the disclosed embodiments provide a wafer **W** that is to have devices ***on both sides*** thereon and, on which, ***normal markers and reversed markers 1-8*** are disposed.

The reversed markers 1-8 are configured as mirror images of the normal markers, about the axis in which the wafer **W** is to be rotated (in the depicted case, about the Y axis). (See, Originally-filed Specification: par. [0048]- [0049]; FIG. 2).

The disclosed embodiments also provide that after, both, *the normal markers and reversed markers* 1-8 are etched into first surface 10a of wafer **W**, the wafer **W** is then flipped over and bonded to carrier substrate **CW** with a layer of adhesive 13, so that the second surface 10b is on top. (See, Originally-filed Specification: par. [0050]; FIGs. 3, 4). The second surface 10b' is then locally etched to expose open primary flood windows 16 above the reversed markers 1-8. (See, Originally-filed Specification: par. [0052]; FIG. 7). A deep trench etch using an etchant selective to Si is performed to form *trenches* 17 that extend down to and around the reversed primary markers 1, 5. (See, Originally-filed Specification: par. [0053]; FIG. 8). Thereafter, device layers can be formed on the second surface 10b' with alignment to the reversed markers 1-8 revealed in trenches 17.

The Examiner rejected claim 1, under 35 U.S.C. §102(b), as allegedly being anticipated by Houston '173. Applicants respectfully disagree.

That is, in dramatic contrast to the Examiner's assertions, none of the asserted references, including the Houston '173 reference, teach or suggest each and every element of claim 1, including the features identified above. In particular, Houston '173 is directed to a method for forming a semiconductor on insulator device that provides accurately-controlled thickness of the outer semiconductor layer, allow processing of the outer semiconductor layer prior to bonding, and provide implementation of buried interconnects. (See, Houston '173: col. 2, lines 3-9). It is to be noted that there is nothing in Houston '173 that suggests the creation of structures on *both sides of a substrate* using lithographic processes.

Along these lines, Houston '173 teaches that trenches 12 define mesas 18a, 18b, and 18c in surface 14 and may also define *alignment marks* in outer semiconductor layer 16 for use in later processing steps. (See, Houston '173: col. 3, lines 50-53). It will be appreciated that the term *mesa* refers to "a broad, flat-topped elevation with one or more clifflike sides". (See, The American Heritage® Dictionary of the English Language, *Fourth Edition*, Houghton Mifflin Company, 2004).

The trenches 12 are filled with an insulation layer 20 to form isolation bodies 21a, 21b and layer 16 is then flipped over so that the previously top planarized surface of layer 16 is bonded to a second planarized surface 30. (See, Houston '173: col. 3, lines 54 – col. 4, line 8; FIGs. 1(a) – 1(c)). The now-top side 32 of flipped-over layer 16 is etched until reaching isolation bodies 21a, 21b to provide a planarized top surface even with the isolation bodies 21a and 21b. (See, Houston '173: col. 4, lines 12 – 17; FIGs. 1(d), 1(e)). With the planarized top surface, Houston '173 further provides that individual components 34 may be formed on mesas 18a, 18b, and 18c by using the *same alignment marks* in layer 16 prior to the bonding step. (See, Houston '173: col. 4, lines 48-51; FIG. 1(e))(see, also, Houston '173: col. 3, lines 51-53, *supra*).

With this said, Applicants remain at a loss as to the Examiner's insistence that the Houston '173 reference teaches the use of normal alignment markers *and at least one reversed alignment marker that is a mirror image of the normal alignment markers*, as required by claim 1. As discussed above, Houston '173 only teaches the use of the same normal alignment markers in the later processing steps that form individual components 34. And, despite the passage citations provided by the Examiner, there is not a single reference in Houston '173 that teaches or even suggests the use of reverse alignment markers or, for that matter, an alignment marker that is a mirror image of another alignment marker. In fact, the terms "reverse," "mirror image," or any language evidencing such features is not used anywhere in Houston '173.

In response to the Applicant's arguments, the Examiner reiterated her assertions by maintaining that Houston '173 teaches trenches that define alignment marks that are mirror images of each other. (See, Office Action: page 5). As noted above, however, Applicants fail to find such a teaching anywhere in the Houston '173 reference. Applicants respectfully point out that, under MPEP § 707.07(g) which relates to the completeness and clarity of the Examiner's action, mandates that "where a major technical rejection is proper, *it should be stated with a full development of reasons rather than by a mere conclusion coupled with some stereotyped expression.*" (*Emphasis added*). Merely cutting and pasting the same rejections, which bunch together numerous claims, or repeating the same bases for the rejections without pointing out where support exists for such bases is inadequate and places an unfair burden on the Applicants.

Moreover, regarding the alleged teaching of trenches, Houston '173 provides the initial formation of trenches 12, which may define alignment marks, in the outer semiconductor layer 16, *prior* to being flipped over and having so planarized surface of layer 16 bonded to a second planarized surface 30. (See, Houston '173: col. 3, lines 50-53). In contrast, Applicants point out that the claimed method requires locally etching the first substrate as far as the protective layer to form a trench around the at least one reversed alignment marker *after* providing a protective layer over the at least one reversed alignment marker and *after* bonding the first substrate to a second substrate with the first side of the first substrate facing the second substrate. In so doing, Houston '173 fails to teach or suggest the local etching of the first substrate as far as the protective layer to form a trench around the at least one reversed alignment marker, as claimed.

Regarding the remaining reference, Geffken '498, Applicants submit that this reference does nothing to cure the deficiencies identified above relative to claim 1.

Thus, for at least these reasons, Applicants submit that the none of the asserted references teach or suggest the claimed combination of elements recited by amended claim 1. Accordingly, Applicants submit that claim 1 is patentable. In addition, because claims 2-18 depend from claim 1, claims 2-18 are also patentable by virtue of dependency as well as for their additional recitations. Accordingly, the immediate withdrawal of the prior art rejections of claims 1-18 is respectfully requested.

With regard to independent claim 19, this claim, as amended, positively recites patterning the first surface of the first substrate with at least one first marker and at least one second marker in which the second marker has *reverse attributes* of the first marker. Claim 19 also positively recites locally etching said first substrate as far as the protective layer to reveal the at least one second marker *by forming a trench around the at least one second marker*. These features are amply supported by the embodiments disclosed in the Specification. (See, e.g., Originally-filed Specification: par. [0053]; FIG. 8).

Applicants rely on the reasons presented above to submit that neither Houston '173 nor Geffken '498, whether taken alone or in combination, teach or suggest each and every element of claim 19, including the features identified above. As such, Applicants further submit that claim 19 is patentable. In addition, because claims 20-26 depends from claim 19, claims 20-26 are also patentable by virtue of dependency as well as for their additional

recitations. Accordingly, the immediate withdrawal of the prior art rejections of claims 19-26 is respectfully requested.

II. Conclusion.

All matters having been addressed and in view of the foregoing, Applicants respectfully request the Examiner's reconsideration of this application, and the immediate allowance of all pending claims.

Applicants submit that this Request for Reconsideration is proper under 37 C.F.R. §1.116, as no claim changes have been proposed and no new matter has been introduced. As such, no additional searches are required.

Applicant's Counsel remains ready to assist the Examiner in any way to facilitate and expedite the prosecution of this matter. If any point remains in issue in which the Examiner feels may be best resolved through a personal or telephone interview, please contact the Undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number **033975**, under Order No. 081468-0306625. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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